

# Chloe D Gustafson, PhD

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ACADEMIC	<b>Postdoctoral Research Scientist</b>	June 2021 - present
APPOINTMENTS	Scripps Institution of Oceanography UC San Diego Supervisor: Dr. Helen Fricker	
	<b>Postdoctoral Research Scientist</b> Department of Geography Swansea University Supervisor: Dr. Bernd Kulessa	Nov. 2020 - May 2021
	<b>Postdoctoral Research Scientist</b> Lamont-Doherty Earth Observatory, Columbia University Supervisor: Dr. Kerry Key	Oct. 2020 - Nov. 2020
EDUCATION	<b>PhD, Earth and Environmental Sciences</b> Lamont-Doherty Earth Observatory, Columbia University Dissertation: <i>Electromagnetic investigations of submarine and subglacial groundwater systems.</i> Advisor: Dr. Kerry Key	Oct. 2020
	<b>MS, Earth Sciences</b> Scripps Institution of Oceanography, University of California San Diego Advisor: Dr. Kerry Key	Dec. 2016
	<b>BS, Geophysical Engineering, <i>Magna Cum Laude</i></b> Colorado School of Mines Outstanding Graduating Senior in Geophysics	May 2015

PUBLICATIONS	<p><b>Gustafson, C. D.</b>, K. Key, M. R. Siegfried, J. P. Winberry, H. A. Fricker, R. A. Venturelli, and A. B. Michaud (2022), A dynamic saline groundwater system mapped beneath an Antarctic ice stream, <i>Science</i>, <i>367</i>. 640-644, doi.org/10.1126/science.abm3301</p> <p>Priscu J. C., J. Kalin, J. Winans, T. Campbell, M. R. Siegfried, M. Skidmore, J. E. Dore, A. Leventer, D. M. Harwood, D. Duling, R. Zook, J. Burnett, D. Gibson, E. Krula, A. Mironov, J. McManis, G. Roberts, B. E. Rosenheim, B. C. Christner, K. Kasic, H. A. Fricker, W. B. Lyons, J. Barker, M. Bowling, B. Collins, C. Davis, A. Gagnon, C. Gardner, <b>C. D. Gustafson</b>, O. Kim, W. Li, A. Michaud, M. O. Patterson, M. Tranter, R. Venturelli, T. Vick-Majors, C. Elsworth (2021), Scientific access into Mercer Subglacial Lake: scientific objectives, drilling operations and initial observations, <i>Annals of Glaciology</i>, <i>62</i>, 340-352, doi.org/10.1017/aog.2021.10.</p> <p><b>Gustafson, C.</b>, K. Key, R. L. Evans (2019), Aquifer systems extending far offshore on the U.S. Atlantic margin, <i>Scientific Reports</i>, <i>9</i>, 1-10, doi:10.1038/s41598-019-44611-7.</p> <p>Blatter D., K. Key, A. Ray, <b>C. D. Gustafson</b>, and R. L. Evans (2019), Bayesian joint inversion of controlled source electromagnetic and magnetotelluric data to image freshwater aquifer offshore New Jersey, <i>Geophysical Journal International</i>, <i>218</i>(3), 1822-1837, doi:10.1093/gji/ggz253.</p> <p>Tinto K., L. Padman, C. Siddoway, S. Springer, H. Fricker, I. Das, F. C. Tontini, D. Porter, N. Frearson, S. Howard, M. R. Siegfried, C. Mosbeux, M. Becker, C. Bertinato, A. Boghosian, N. Brady, B. Burton, W. Chu, S. I. Cordero, T. Dhakal, L. Dong, <b>C. D. Gustafson</b> S. Keeshin, C. Locke, A. Lockett, G. O'brien, J. J. Spergel, S. E. Starke, M. Tankersley, M. G. Wearing, and R. E. Bell (2019), Ross Ice Shelf response to climate driven by the tectonic imprint on seafloor bathymetry, <i>Nature Geoscience</i>, <i>12</i>, 441-449, doi.org/10.1038/s41561-019-0370-2</p>
FUNDED PROPOSALS	<p><b>Investigation of the Lithosphere/Asthenosphere Boundary and Course in Geophysical Methods at Sea</b></p> <p>Funding source: U.C. Ship Funds 2016</p> <p>Funded amount : \$6200</p> <p>Ship time acquired: 16 days</p>
SEMINARS	<p>Unveiling extensive groundwater systems beneath oceans and ice sheets using electromagnetic geophysics. Jan. 2022 <i>California Institute of Technology, Seismology Lab Seminar</i></p> <p>A dynamic saline groundwater system mapped beneath an Antarctic ice stream. Oct. 2021 <i>Scripps Institution of Oceanography, Polar Seminar</i></p> <p>Unveiling extensive groundwater systems beneath oceans and ice sheets using electromagnetic geophysics. Oct. 2021 <i>Georgia Tech, School of Earth and Atmospheric Sciences Virtual Seminar Series</i></p> <p>Magnetotelluric applications in Antarctica. Aug. 2021</p>

*Magnetotelluric minicourse, GAGE/SAGE workshop*

- Unveiling extensive aquifer systems beneath oceans and ice sheets using electromagnetic geophysics. June 2021  
*Scripps Institution of Oceanography, Institute of Geophysics and Planetary Physics Virtual Seminar Series*
- Hidden hydrology: Geophysical imaging of a deep and dynamic subglacial groundwater system in West Antarctica. April 2021  
*McWilliams Seminar Series, Tulane University*
- Wet hot rocks and cool geophysics: does groundwater lubricate Antarctic ice flow? Nov. 2020  
*University College London, Institute for Risk and Disaster Monthly Seminar*  
*Jointly presented with B. Kulessa*
- Magnetotelluric imaging of subglacial groundwater beneath Whillans Ice Plain, West Antarctica. July 2020  
*Electromagnetic Methods Research Consortium at Columbia University Summer Workshop*
- Wet hot rocks and cool geophysics: does groundwater lubricate Antarctic ice flow? July 2020  
*International Glaciological Society Global Seminar*  
*Jointly presented with B. Kulessa*
- Exploring Antarctic Subglacial Hydrology using MT. April 2020  
*IRIS Webinar: Magnetotelluric Science Vignettes*
- Characterizing extensive hydrogeologic systems beneath ice sheets and oceans using electromagnetic methods. April 2020  
*Australian Society of Exploration Geophysicists Global Webinar*
- Geophysical imaging of subglacial and submarine groundwater systems. Feb. 2020  
*Department of Geology Colloquium, University of Kansas*
- Imaging groundwater systems beneath ice sheets and oceans. Jan. 2020  
*Department of Geosciences Colloquium, Pennsylvania State University*
- Investigating subglacial hydrogeology of Whillans Ice Plain, West Antarctica, using magnetotelluric data. Oct. 2019  
*Department of Geophysics Heiland Lecture, Colorado School of Mines*
- The first magnetotelluric survey of an active subglacial hydrologic system. Oct. 2019  
*Geoscience Seminar, University of Colorado Boulder*
- Addressing the sea level challenge. March 2019  
*Lamont Advisory Board Meeting, Columbia University*  
*[co-presenter with R. Bell, M. Tedesco, and M. Cashman]*
- An extensive offshore aquifer on the U.S. Atlantic margin. Oct. 2018  
*EM Methods Research Consortium Workshop, Columbia University*

An appraisal of offshore groundwater on the U.S. Atlantic Margin. Oct. 2018  
*Marine Geology Seminar, Rutgers University*

A pilot electromagnetic survey of groundwater beneath the U.S. Atlantic con- April 2018  
tinental shelf.  
*First year and transfer colloquium, Lamont-Doherty Earth Observatory*

Resolution capabilities of marine CSEM imaging of subduction zones. May 2016  
*Seafloor EM Methods Consortium, Scripps Institution of Oceanography*

CONFERENCE  
ABSTRACTS

*Invited* **Gustafson, C.**, K. Key, M. Siegfried, P. Winberry, H. Fricker, R. Venturelli, and  
*Talk.* A. Michaud. 2021. A deep and dynamic groundwater system beneath an Antarctic  
ice stream. *AGU 2021 Fall Meeting*.

*Talk.* Siegfried, M., R. Venturelli, M. Patterson, W. Arnuk, T. Campbell, **C. Gustafson**,  
A. Michaud, B. Galton-Fenzi, M. Hausner, S. Holzschuh, B. Huber, K. Mankoff, D.  
Schroeder, P. Summers, S. Tyler, S. Carter, H. Fricker, D. Harwood, A. Laventer,  
B. Rosenheim, M. Skidmore, J. Priscu, and the SALSA Science Team. 2021. The  
life and death of a subglacial lake in West Antarctica. *AGU 2021 Fall Meeting*.

*Poster.* Le, H., K. Key, **C. Gustafson**, and D. Blatter . 2021. A Resolution Comparison of  
Surface-towed and Seafloor Electromagnetic Data for Imaging Submarine Aquifers:  
A Case Study from the U.S. Atlantic Margin. *AGU 2021 Fall Meeting*.

*Invited* **Gustafson, C.**, K. Key, M. Siegfried, and H. Fricker. 2020. Extensive saline  
*Talk.* groundwater beneath Whillans Ice Stream, West Antarctica. *AGU 2020 Fall Meet-  
ing*.

*Invited* **Gustafson, C.**, K. Key, and R. Evans. 2020. Electromagnetic geophysical mapping  
*Talk.* of offshore freshened groundwater on the U.S. Atlantic margin. *GSA 2020 Fall  
Meeting*.

*Talk.* **Gustafson, C.**, K. Key, M. Siegfried, and H. Fricker. 2020. Imaging salty ground-  
water in sedimentary basins beneath Whillans Ice Plain, West Antarctica. *West  
Antarctic Ice Sheet Workshop*.

*Talk.* **Gustafson, C.**, K. Key, M. Siegfried, and H. Fricker. 2020. Deep imaging of  
subglacial hydrology. *International Thwaites Glacier Collaboration Science Meeting  
June 2020*.

*Invited* **Gustafson, C.**, K. Key, and R. Evans. 2019. Characterizing offshore aquifer  
*Poster.* systems on the U.S. Atlantic margin with electromagnetic methods. *AGU 2019 Fall  
Meeting*.

*Poster.* **Gustafson, C.**, K. Key, M. Siegfried, and H. Fricker. 2019. Electromagnetic  
imaging of subglacial hydrogeology of Whillans Ice Plain, West Antarctica. *AGU  
2019 Fall Meeting*.

- Talk.* Siegfried, M., H. A. Fricker, **C. Gustafson**, K. Key, A. Laventer, J. E. Dore, B. Huber, K. Mankoff, J. Priscu, B. Rosenheim, and the SALSA Science Team. 2019. Anatomy of a draining subglacial lake in West Antarctica. *AGU 2019 Fall Meeting*.
- Talk.* **Gustafson, C.**, K. Key, M. Siegfried, and H. Fricker. 2019. Basal to bedrock: magnetotelluric imaging of an active subglacial hydrologic system. *West Antarctic Ice Sheet Workshop*.
- Poster.* Siegfried, M., H. Fricker, **C. Gustafson**, K. Key, A. Leventer, J. Dore, B. Huber, K. Mankoff, J. Priscu, B. Rosenheim, and the SALSA Science Team. 2019. Physical properties of a draining subglacial lake, *West Antarctic Ice Sheet Workshop*.
- Poster.* **Gustafson, C.**, K. Key, R. L. Evans, and D. Blatter. 2018. An extensive offshore aquifer on the U.S. Atlantic margin, *24th Electromagnetic Induction Workshop, Helsingør, Denmark*.
- Poster.* Person, M., **C. Gustafson**, K. Key, R. L. Evans, M. Steckler, C. Paola, V. Voller, C. Grall, A. Micallef, D. Cohen, and J. W. Wilson. 2018. The Role of Sediment Transport and Sea-Level Fluctuations on the Sequestrations of Offshore Freshwater Along Passive Continental Margin Environments, *EGU General Assembly*.
- Talk.* **Gustafson, C.**, K. Key, and R. L. Evans. 2017. A pilot electromagnetic survey of groundwater beneath the U.S. Atlantic continental shelf, *AGU 2017 Fall Meeting*.
- Poster.* **Gustafson, C.** and K. Key. 2016. Resolution study of marine CSEM imaging of subduction zones, *AGU 2016 Fall Meeting*.
- Poster.* **Gustafson, C.** and K. Key. 2016. Resolution study of marine CSEM imaging of subduction zones, *23rd Electromagnetic Induction Workshop, Chang Mai, Thailand*.

FIELDWORK	<b>Santa Barbara, CA, Marine EM Survey.</b> Deployed surface-towed controlled source marine electromagnetic instruments. Assisted in ROV operations. <i>R.V. Bob and Betty Beyster.</i>	Sept. 2021
	<b>Hikurangi Trench, New Zealand, Marine EM Survey.</b> Recovered 42 seafloor magnetotelluric instruments. <i>R.V. Roger Revelle.</i>	Feb. 2019 - March 2019
	<b>Whillans Ice Plain, West Antarctica, Surface Geophysics.</b> Conducted EM, GPS, and radar experiments. Installed long-term subglacial observatory.	Nov. 2018 - Jan. 2019
	<b>Ross Ice Shelf, Antarctica, Airborne Geophysics.</b> Processed aerogeophysical datasets.	Oct. 2017 - Dec. 2017
	<b>Pawnee, Oklahoma, U.S., Land MT Survey.</b> Deployed and recovered land magnetotelluric instruments.	Nov. 2016
	<b>Okmok Volcano, Alaska, U.S., Marine EM Survey.</b> Deployed and recovered seafloor magnetotelluric instruments. <i>R.V. Thompson and R.V. Sikuliaq.</i>	June 2015 - July 2015
	<b>Pagosa Springs, Colorado, U.S., Geophysics Field Camp.</b> Conducted seismic, gravity, magnetic, electrical, electromagnetic, and differential GPS surveys.	May 2014 - June 2014
SERVICE	<b>Committee Service</b> <ul style="list-style-type: none"> <li>◦ IRIS Electromagnetic Advisory Committee member</li> <li>◦ IRIS MT Wideband Equipment Selection Committee</li> <li>◦ COmmunity Organized, PEer Assisted experTise Exchange in ElectroMagnetic geophysics (COOPERATE EM) co-founder and co-organizer</li> </ul>	Jan. 2021 - Jan. 2023
	<b>Referee Service</b> <ul style="list-style-type: none"> <li>◦ Reviewed Journals: <i>Frontiers in Marine Science</i>, <i>Geophysical Research Letters</i>, <i>Journal of Applied Geophysics</i>, <i>Journal of Glaciology</i>, <i>Water Resources Research</i>.</li> <li>◦ NSF Hydrologic Sciences proposal reviewer</li> </ul>	
	<b>Conference Service</b> <ul style="list-style-type: none"> <li>◦ Primary convener, “Archives and Observations of sub-ice environments”, AGU 2021 Fall Meeting</li> <li>◦ Primary convener and lead session chair, “Sub-ice-sheet and sub-ice-shelf environments: Bridging the gap between modern observations and geologic records”, AGU 2020 Fall Meeting</li> <li>◦ Lead session chair, “Frontiers in Electromagnetic (EM) Geophysics”, AGU 2020 Fall Meeting</li> <li>◦ Co-convener, “Sub-ice-sheet and sub-ice-shelf environments: Bridging the gap between modern observations and geologic records”, AGU 2019 Fall Meeting</li> </ul>	Fall 2021 Fall 2020 Fall 2020 Fall 2019

### University Service

- Unlearning Racism in the Geosciences (URGE) field safety planning subcommittee, Scripps Institution of Oceanography Jan. 2022 - May 2022
- Divisional Seminar Co-organizer, Marine Geology and Geophysics Seismology, Geology and Tectonophysics, Lamont-Doherty Earth Observatory Aug. 2019 - Aug. 2020
- Changing Ice Changing Coastlines Committee, Lamont-Doherty Earth Observatory Aug. 2018 - Jan. 2020
- Graduate Student Committee, *Social Chair*, *Chevron Student Initiative Fund Liaison*, Lamont-Doherty Earth Observatory Aug. 2018 - May 2020

### White Papers

- Co-Author, “Early Career Community Vision For Future Magnetotelluric Facility” June 2020
- Co-Author, “Assessment of East Antarctic Ice Sheet sensitivity to warning its potential for contributions to sea level rise,” Subglacial Access Community Future Science Planning Workshop. March 2019
- Co-Author, “Access Drilling Priorities in Greenland,” Subglacial Access Community Future Science Planning Workshop. March 2019

### SELECTED MEDIA & OUTREACH

PBS News Hour SciTechNow [television] (air date: March 23, 2020).  
<https://www.scitechnow.org/videos/scitech-now-episode-619-3o7ow5/>

Antarctic Week Talk with a Scientist Video Call. Farmington Middle School. Nov. 2019.

Antarctic Week Talk with a Scientist Video Call. Hoover Middle School. Nov. 2019.

BBC News World Service (2019). “Could there be drinking water under the seas?” [podcast] Science in Action.  
<https://www.bbc.co.uk/programmes/w3csym1w>

Caperton Morton (2019). “Huge Aquifer Imaged off the Atlantic Coast.” *EOS*  
<https://eos.org/articles/huge-aquifer-imaged-off-the-atlantic-coast>

Seeker (2019). “Scientists Just Discovered Fresh Water Under the Ocean, and It’s HUGE.” *Over 1.3 million views on YouTube.*  
[https://www.youtube.com/watch?v=e\\_XZbsIo-aA](https://www.youtube.com/watch?v=e_XZbsIo-aA)

Guest scientist. Public School 70, Bronx, New York City. October 2018.

### ADDITIONAL TRAINING

MicroMBA from the Rady School of Management at UC San Diego. Summer 2021

SMART Summer School. Understanding marine hydrogeology through the lens of geophysics: Bridging the gap across the coastal zone. Summer 2019

TEACHING	Electric and Electromagnetic Methods and Applications, Colorado School of Mines. Guest Lecturer for marine electromagnetic classes.	April 2022
	Computational Earth Science. Columbia University. Teaching Assistant.	Fall 2019
	Earth Origin, Evolution, Processes, and Future. Columbia University. Teaching Assistant.	Spring 2018
INTERNSHIPS	<b>Chevron (Petro-Technical Data Management Group)</b> Evaluated seismic and well data transfer software. Evaluated and updated seismic meta data.	June - Aug. 2014
	<b>U.S. Geological Survey National Earthquake Information Center</b> Created ShakeMaps for historical and recent earthquakes. Processed seismic time series.	May 2013 - Jan. 2014